

Network Topology of Fishing Decisions: Simulations of Climate Resilience

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Abstract

As climate change reconfigures ocean ecosystems, there is an urgency to develop a more complete understanding of the responses of commercial fishers reliant on those ecosystems and the resilience of the fishery and fishing communities. Research to date has demonstrated that fishers use diversification strategies to mitigate risk associated with both long-run climate change and short-run climate shocks. While network theory is a promising tool for measuring and understanding effort allocation between fisheries, which is the basis of fishery diversification, the economic foundations that explain network topology and resilience to climate shocks are not fully understood. I use a simulation approach whereby a structural Random Utility Model (calibrated to fish landings data) determines individual fishing choices throughout the year, and their aggregated decisions give shape to the complex system's network. With a machine learning prediction procedure, I test the accuracy of network variables in describing the resilience of a regional commercial fishing fleet, mapping individual vessels' fishery diversification behavior to the fleet's ability to withstand climate shocks. This research contributes to fishery science, economics and policy by connecting the micro-foundations of individual fishing decisions with the macro behavior of networks to improve our understanding of resilience and equity in commercial fishery systems.